

diately ; but this is over very soon, and they have all remained as motionless and bad as before. And the second case above-mentioned has made us here very cautious in proceeding to its use in many patients, for fear of bringing on worse symptoms than they had before, by it.

XCV. A Letter from the Reverend William Brakenridge, D.D. and F.R.S. to George Lewis Scot, Esq; F. R. S. concerning the Number of Inhabitants within the London Bills of Mortality.

Dear Sir,

Read Nov. 21,
1754.

AS I have lately had the curiosity to consider, the number of inhabitants in London and Westminster, whether they increase or decrease ; I presume to send you the observations I have made. For as no one understands numbers better than yourself, your approbation will much confirm me in my opinion, and perhaps have weight with many others ; when you can easily find out any paralogism or mistake, that I may have made. And if you can spare any time from your great employment, to think upon the subject, and to rectify any thing that may be amiss in my method of computing ; it will be very obliging.

I have consulted the yearly bills of mortality for the last fifty years, which I imagine will be sufficient for my purpose ; and from them I have extracted all the numbers of the baptisms and burials, both within the

the walls of London, and at large within the bills : for I thought that within the city walls, where the number of houses is nearly known, the baptisms and burials might be very useful to reason upon, concerning the whole inhabitants both within and without. And because it may be surer, to compute from a number of years taken at an average, than from the numbers in any one year as they stand in the bills ; I have taken the sums of the numbers, for each five years of the fifty, and then the fifth part of each of these sums ; which will at a medium be the number for any particular year. And in like manner, I have taken the sums of the numbers for each ten years, and the tenth part of each of the sums will be the number for any year, at an average. And the numbers so found will appear thus :

Years.	Baptisms.	Burials.	Baptisms.	Burials.
1704—8	1870	2553	15867	22103
1709—13	1805	2551	15288	21701
1714—18	1890	2706	17586	24641
1719—23	1871	2719	18360	26978
1724—28	1829	2727	18442	27670
1729—33	1578	2532	17452	26267
1734—38	1406	2242	16762	26165
1739—43	1221	2397	15034	28219
1744—48	1062	1989	14402	23884
1749—53	1087	1790	14850	22006
1704—13	1837	2552	15577	21602
1714—23	1880	2712	18073	25809
1724—33	1703	2647	17920	27168
1734—43	1313	2320	15898	27192
1744—53	1074	1890	14626	22945

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Where the numbers are ranged in five columns. The first denotes the years, the second and third the baptisms and burials within the city walls, and the third and fourth shew the baptisms, and burials at large within the bills. Thus, for instance, 22945 is the number of burials, at a medium, for any of the ten years within the bills from 1744 to 1753 inclusive. And in like manner, 1221 is the number of baptisms for any year, at an average for five years, from 1739 to 1743 inclusive, and so of others. The numbers above the line are computed for five years, and those below are for ten.

In the burials it is always to be considered, that there are perhaps 2000 more, than what the bills represent them. For there are burying-grounds belonging to the Protestant Dissenters, the Quakers, and the Jews; of which there is no account taken, and that are very considerable. In the first of which in Bunyan-Fields, I have been informed there are about 400 burials in the year, and in the others, together, there may be about 400 more; which sum of 800 we may suppose comes from all parts within the bills. But I think the one-half, *viz.* 400, must at least come from within the city; where there are most Protestant Dissenters and Jews. So that 400 may always be added to the burials, within the city. It is likewise to be remembered, that both from within and without the city, a great many burials go out into the country, of which there is no notice taken. But from what I have observed, if we were to suppose, that there are 1200 in the whole, carried out into the country, over and above the 800 mentioned above, in the burying-grounds; I should imagine that to be the

outmost. And therefore in our calculations we shall suppose 2000 burials yearly, more than in the bills at large. And which, whether we are exact enough or not in the supposition, will by no means hinder us to discover the increase, or decrease of the people.

It is next to be observed, that in the bills the baptisms are always about two-fifth parts at least, less than the burials, with the numbers added to them above-mentioned; and that this difference within the city seems continually to increase, so that it is much greater now than it was some years ago; which appears plainly to arise from two causes; the number of Dissenters of various denominations, and the multitude of people that live unmarried. But I think it is rather owing to the last: for in London and Westminster the one-half of the people at least live single, that are above twenty-one years of age; which must prevent almost as many more births, that might be reasonably expected. And this is not mere conjecture; for I have had some proof from a particular detail given me of one parish within the city; where the greater part of those that are above that age are single. In the natural state of mankind it seems plain, that the number of births should be greater than the burials, and I believe that in many parishes in the country they are near double. I found it so in the Isle of Wight, where I lived some time, and had an opportunity to see their registers; for there the births were generally near double. And even in London, before the great fire in 1666, it appears, from some parish registers, that the baptisms were near about equal to the burials, and never afterwards: the reason of which I do not understand, unless it
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be that more people were then married, and that from that time there was a greater confluence of strangers : for there certainly were more Dissenters at that time than ever after.

It is farther to be observed, that in the bills from the year 1704 to the year 1728, without the city, both the number of christenings and burials continually increased; and that from that time to 1743, they continued nearly the same; but that after 1743 they gradually decreased till this time; which plainly shews, that the inhabitants were increasing till about the year 1728; and that from thence to 1743, they remained in the same state nearly; but that afterwards, during the last ten years, till 1753, they were constantly diminishing. For it is evident, that the number of inhabitants must always be in proportion, to the number of births, and burials considered together. And hence it appears, that the cities of London and Westminster, were in the most flourishing state, with regard to numbers, from 1728 to 1743, and that they are now past their height, and in the same state they were in the year 1708; and the first decrease seems to have been at the beginning of the last French war, which was in 1744. Within the city walls the number of the inhabitants do not seem to fluctuate, in the same periods of time, as without; for the most numerous state of the city, appears to have been from the year 1718, to the year 1728, and then after that they have been continually decreasing: so that when they were most numerous within the walls, they were not then arrived at the height without; and when they were in the highest state without, they were diminishing in the city.

city. Perhaps the vast number of new buildings, within the liberties of Westminster, may have in part caused this diminution. And as from the year 1718, within the city, the christenings have been so remarkably decreasing, that they are now but three-fifths of what they were at that time, and the burials are likewise diminished above one-fourth in the last five years; this seems to shew that the inhabitants within the city walls must be near one-fourth fewer, than they were in the year 1718.

Now, in order to calculate the number of inhabitants, it will be necessary to observe, that in a year in London there generally dies one person in thirty. This Sir William Petty has long ago observed; and I have found it to be near the truth, upon consulting my parish register. For in the parish of Bassishaw, London, there are not above 800 people, as appears from an account that I had lately given me: And the burials for the last ten years in the whole amount to 262; which at a medium gives 26 for one year, which is the thirtieth part of 800 nearly. In some parishes in London there die more than in this proportion, as in St. Giles's Cripplegate; and in others in the out-parts of the town there die fewer; but I believe, in general it will hold true, in and about the city. In the town of Breslaw in Germany, from which Dr. Halley formed his famous table for the probabilities of life, there die about two in sixty-nine, that is less than one in thirty-four; as is plain from an easy computation. But there certainly die more than in that proportion, within the London bills; for it appears, that one-third at least of the children die under two years of age; whereas at Breslaw there die

under that age, only one-fifth; and therefore the difference being two-fifteenths, or four-thirtieths, there die four in thirty more at London than at Breslaw, under two years of age.

In the country the case is very different; for there does not die above one in fifty, in healthy places. Sir William Petty has likewise observed this, and I have found it true. For in the parish of Newchurch in the Isle of Wight, where I resided some time, there are about 900 people, and there does not die, at a medium, above eighteen yearly; which is one in fifty exactly. And I believe this will be found to be nearly the same, in most of the counties in Britain, where the people do not live in great towns; which shews the great difference between the effects of the air, in London and the country.

If then it be allowed, that in London and Westminster there dies one in thirty, it will be very easy to make a calculation of the whole number of the people nearly, that are within the bills. For if we take the number of burials at an average for some years, and multiply that by 30, the product must be the number of the people. Thus if we take the number of the burials, at large within the bills, for any one of the last ten years, at a medium, from 1744 to 1753 inclusive, to be 22945, and add to this 2000, for those burials omitted in the bills, as is supposed above, the total will be 24945, all the burials within the limits of the bills, for one year at 1753; and then multiply this by 30, the product 748350 will be the whole number of the people nearly, at present. But if we take 27192, the number of the burials, at a medium, for any one of the ten

ten years preceeding 1744 inclusive, and add to this 2000, as above; the whole of the burials at that time within the bills will be 29192, which being multiplied by 30 gives 875760, for the number of the people at the year 1743. And therefore the inhabitants are fewer now than they were in 1743, by 127000. I have taken the numbers, at a medium, for ten years, to avoid any uncertainty, that might arise about a computation for a single year.

If we were to try the same calculation, by taking the burials, at a medium, only for five years to 1753, and also for five years to 1743 inclusive, the difference will be greater. For the numbers at these two times will be 720180, and 906570, of which the difference is 186390; so that the people would appear fewer at 1753 than they were in 1743, by 186000. But this is not so much to be depended upon as the numbers above; because there were two extraordinary bills at 1740 and 1741. Or if we should imagine that there might not more die at London than at Breslaw, that is one in thirty-four, still the difference would be greater than we found at first. For taking the burials at an average for ten years, at 1753 and 1743, as above, the numbers would at these two times be 848130 and 992518, of which the difference is 144398; so that it seems plain, if the bills are to be depended upon, that there is a decrease of the people since 1743 of above an hundred thousand, and that at present the number is about 740000. And this decrease has been annually continued: for if we try the thing farther, at the distance of five years, and take at a medium for five years, the burials for 1753 and 1748, the numbers

will come out 720180 and 776520 ; of which the difference is 56340, the number decreased for the last five years.

There is another way of computing from the number of houses ; but I think this not so certain as the other. For here are two difficulties, to ascertain the number of houses, and to fix on the number of persons for each house. As to the last, Sir William Petty thought we might allow eight persons to a house ; which I have found to be a mistake. I have made an experiment of it, and got an exact account of the numbers in each house in a certain parish in London ; and I find that they exactly come to fix in a house, empty and full together, for there is seldom above one in twenty empty. And as in that parish the people are in a middle condition, and some of them have a number of servants ; it may be presumed they are in a middle state with regard to numbers, between the very great families and those in the lowest rank. This is also confirmed, if we allow, as above, one in thirty to die yearly in London. For within the city walls there were 11857 houses in the 97 parishes, as appears from Mr. Smart's account, which was supposed to be very accurate at that time : But since he published that in 1741, there are not so many houses within the city walls ; for in many parishes there are houses greatly enlarged, some rebuilt in place of two or three, and warehouses made of others. I know some parishes in which there is one in twenty fewer than in his time. In others perhaps there is no alteration. But I think they must, at an average, be diminished three in an hundred at least ; and consequently

frequently there are about 354 fewer, and the number of houses within the city walls is about 11503; which being multiplied by 6, gives 69018, for the number of inhabitants; which is nearly equal to the burials 2290 multiplied by 30, or 68700; taking the burials at a medium for ten years, and adding 400 as above.

The number of houses within the bills may then be nearly come at, from the number of burials. For if we take the number of burials, for the last ten years, at an average, within the city to be 1890, and add 400, which makes 2290, we may say, if 2290 comes from 11503 houses, then the whole number 24945 of burials within the bills, having allowed 2000 as above, must come from 125302 houses. And there cannot be fewer; for there are more burials within the city, in proportion to the baptisms, than in the out-parishes; and therefore more burials in proportion to the number of houses; which shews that the number of houses cannot be less than 125302; which being multiplied by 6, will give 751812, for the number of people for this present time; and it is nearly equal to the number 748350 found above. So that the numbers produced from these two methods being almost equal, this is some farther proof that our supposition of six persons to a house, empty and full, is near to the truth. But if we suppose, that the number of houses within the walls is now the same, as in Mr. Smart's time, 11857; then all the houses within the bills will be 129158, and the number of people 774948 greater than 748350, found above, by 26598; which is not much in such calculations.

Sir William Petty likewise says, that he was informed there were 84000 houses tenanted within the bills, in the year 1682, in which he wrote; and if so, the number of houses seem to be increased, near one-third since that time. And, according to our way of computing, to suppose six to a house, empty and full, there could not be more than 504000 people at that time; which is less than the number we found above for the present time, 748350, by 244350. But now, instead of increasing, we are decreasing; for since the year 1743 the inhabitants have been annually diminished; by which it appears that this great city is past its height, and is rather upon the decline with regard to numbers. And hence we see how far Sir William was mistaken, who imagined that it might increase continually till the year 1800; when the number of people would be five millions, that is near seven times as much as they are at present.

Now, to account for this decrease there may be various conjectures: I think three causes may be assigned, that may all operate jointly. One may be the vicious custom that has prevailed of late years, among the lower people, of drinking spirituous liquors; another the fashionable humour of living single, that daily increases; and a third may be the great increase of trade in the northern parts of Britain, that keeps the people there employed at home, that they have no occasion, as formerly, to come hither for business; and it were to be wished that this cause was the most prevailing. But whatever be the cause, it seems plain to me, that it could not be the late French war, as some imagine. For by what
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was shewn above, there has been a decrease of 56000 since the year 1749, after the peace; but if the war had been the cause, there ought rather to have been an increase after it. And as in the whole, we could not have lost more than 150000, in the war by land and sea, of which there was not one-fifth, or 30000, taken from about the city; this can never account for 64000, the decrease before the year 1748. In the former war, between 1702 and 1711, the city never decreased, but continually increased: from which one would imagine that the last war could not diminish its numbers.

Nor can this decrease in the bills be accounted for, from a greater number than formerly leaving the town in summer; because it does not appear that there is a greater number of such, than was ten years ago. And if it could be allowed that the number was greater, it can never be thought that it can amount to 120000 more than in year 1743.

It is true, this decrease may appear surprising to some, when they see the number of new buildings in Westminster, continually increasing; but then, on the other hand, it is likewise to be considered, that there are a great number of houses enlarged, or rebuilt, in place of two or three others, as mentioned above; and others falling in, and empty, about the eastern parts of the city: so that for the last twenty years the inhabitants seem only to be moving, from the eastern to the western parts of the town, and not increasing.

And now, Sir, I am afraid I have tired you with this long letter, in which I have endeavoured to represent the present circumstances of this great city.
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with regard to numbers, and, if I have committed any mistake, I hope your usual goodness will excuse,

Dear Sir,

Sion-College,
Novem. 20,
1754.

Your most obedient servant,

W^m. Brakenridge.

XCVI. *A Letter from Mr. William Watson, F. R. S. to Charles Gray, of Colchester, Esq; F. R. S. in relation to a large Calculus found in a Mare.*

Dear Sir,

London, July 26, 1754.

Read Nov. 21,
1754.

I Take this opportunity, by your means, of sending back to its owner, who is so unwilling to part with it, the stone taken out of the belly of the mare, which you were so obliging as to send me. I should have been glad indeed to have been informed precisely, from what part of the abdomen of the mare it was taken; but this you was prevented from transmitting to me, on account of the ignorance of the person, who opened the mare, and who said, that the stone was found in or near her kidneys; though I am of opinion it was formed in the intestinal tube. As there are at present no ordinary meetings of the Royal Society, I was prevented from laying this stone before that learned body: I shewed it, however to several of the gentlemen, who, with myself, agree, that a stone, large
as